REMARKS

The Applicant respectfully requests entry of this amendment to accept materials submitted herewith and to place this application in better condition for appeal. Attached are:

(1) a hardcopy of paper entitled "Finding the Ideal Disc Drive for 2.5-Inch External USB Applications" obtained from an Internet Web Site at http://www.seagate.com/docs/pdf/whitepaper/TP-535.pdf, and

(2) a hardcopy of a Wikipedia article entitled "C-ROM" obtained from an Internet Web Site at http://en.wikipedia.org/wiki/Hard_drive#Other_characteristics.

The relevance of these materials will become apparent in the remarks below.

The Office Action dated June 29, 2005 rejected claims 1-4 under 35 U.S.C. § 112, first paragraph. More specifically, claims 1 and 3 were rejected on the grounds that the specification allegedly failed to disclose the limitation of "controlling a spindle motor at an angular velocity lower than a maximum annular [sic "angular"] velocity assigned to CAV control from start of spin-up processing." The Office Action asserts that the spindle motor is controlled to be CAV with **NO** specific speed, and **from start** up, the speed is not lower than a maximum velocity (bold in Office Action).

It is respectfully submitted that the specification fully supports this limitation. For example, the specification describes "spin up processing" on page 5. In the context of data storage devices, including but not limited to disc drives, "spin up" is recognized in the technical field to include a relatively rapid increase in rotational speed of a storage medium. *See, for example*, "Finding the Ideal Disc Drive for 2.5-Inch External USB Applications." This shows by usage on page 2 that "spin up" conveys a meaning to persons skilled in the art. (Applicant does not intend to limit the claims in any manner to the example of the article, such as by limiting the type, format, capacity, or other aspect of any device disclosed in the article.) It is not necessary

for an application to disclose information already known in the art. While the claims have a measure of breadth by being silent about any specific initial or final rotational speed, the absence of a numeric example does not render the claims indefinite. Initial and final spin-up speeds may vary from device to device, and they may increase in the future. Maximum device speeds may also change over time. *See*, for example, the Wikipedia article in the paragraph bridging pages 4 and 5 describing past increases in maximum speed as mechanical constraints were overcome. (Applicant does not intend to limit the claims in any manner to the example of the article, such as by limiting the type, format, capacity, or other aspect of any device disclosed in the article.) Lower, higher, and maximum speeds may be determined in the context of analyzing a specific accused device, which at the time of analysis will have a definite maximum speed and which can be analyzed to determine if speeds at the beginning of spin-up are lower than speeds after spin-up. It is therefore proper to define a limitation in terms of an increase in rotational speed and a maximum speed without limiting the claim to specific numeric values.

Claims 1 and 2 were rejected as anticipated by "Applicant's Admitted Prior Art." Applicant respectfully submits that the Background method described in Figs 2 and 3 does not use CAV from the start of the spin-up process. Compare Step 1 (page 2) and Step 1 (page 5):

> (Background method, p. 2)
>
> In step S1, setting is made to drive the spindle motor 2 at a constant linear velocity by CLV control. In step 2, servo adjustment is carried out. In step 3, a LEAD IN final address is acquired. In step 4, CLV measurement is carried out at the above address by CLV control.

> (Preferred embodiment, p. 5)
>
> In step s1, setting is made to drive a spindle motor 2 by CAV control (constant angular velocity control) instead of conventional CLV control (constant linear velocity control). In step S2, servo adjustment is carried out. In step S3, a LEAD-IN final address is acquired. In step 4, CLV measurement is carried out.

In the Background method (p. 2), CLV control is used during spin up before acquiring a LEAD-IN final address. As disclosed for the preferred embodiment (p. 5), CAV control is used during spin-up before acquiring a LEAD-IN final address. Thus, the Background method does not use CLV control from the start of the spin-up process.

Claims 1 and 2 were rejected as anticipated by Ishihara et al. USP 5,805,548 ("Ishihara") and cite a number of passages and figures. Applicant fails to see where those passages describe CAV control from the start of a spin-up. The passage at col. 8, line 30 to col. 9, line 44, along with Fig. 2, appear to describe a hardware architecture and a steady-state reading operation under CLV control, but not a spin-up process. The passages at col. 10 line 61 to col. 11, line 54, along with Figs. 5 and 6, appear to describe further aspects of steady-state reading operation under CLV control, but not a spin-up process. The passages at col. 14, lines 43-52, and Fig. 10, again appear to disclose a reading state under CLV control, but not a spin-up process. The Applicant respectfully submits that none of the cited passages discloses a spin-up process under CAV control from start.

Claims 3 and 4 were rejected as obvious over "admitted prior art" and Ishihara. As discussed above, the Applicant fails to see where the Background method of this application or Ishihara discloses a spin-up process under CAV control from start.

Claim 1 has been amended merely to correct a typographic error and is not intended to alter the claim scope in any way.

Accordingly, the application is now in condition for allowance and a notice to that effect is respectfully requested.

Any amendments to the claims not specifically argued to overcome a rejection based upon the prior art have been made for clarity, a purpose unrelated to patentability.

If a telephone conference would be of value, the Examiner is requested to call Applicants' undersigned attorney at the number listed below.

The Commissioner is hereby authorized to charge any missing or insufficient fee(s) or credit any overpayment, to Deposit Account No. 19-4293.

Respectfully submitted,

Date: September 29, 2005

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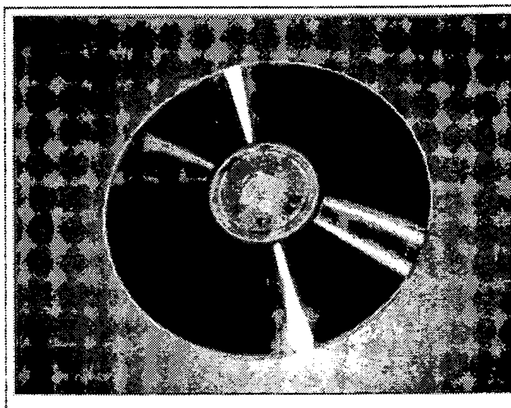
CD-ROM

From Wikipedia, the free encyclopedia.

The **CD-ROM** (an abbreviation for "Compact Disc Read-Only Memory") is a non-volatile optical data storage medium using the same physical format as audio compact discs, readable by a computer with a CD-ROM drive. A CD-ROM is a flat, metallized plastic disc with digital information encoded on it in a spiral from the center to the outside edge. The CD-ROM Yellow Book standard was established in 1985 by Sony and Philips. Microsoft and Apple Computer were early enthusiasts and promoters of CD-ROMs. John Sculley, CEO of Apple at the time, said as early as 1987 that the CD-ROM would revolutionize the use of personal computers.

CD-ROM reading devices are a standard component of most modern personal computers. In general, audio CDs are distinct from CD-ROMs, and CD players intended for listening to audio cannot make sense of the data on a CD-ROM; though personal computers can generally read audio CDs. It is possible to produce composite CDs containing both data and audio with the latter capable of being played on a CD player, whilst data or perhaps video can be viewed on a computer. These are called Enhanced CDs.



CD-R

Contents

How it works

Digital information is encoded at microscopic size, allowing a large amount of information to be stored. CDs record binary data as tiny pits (and non-pits) pressed into the lower surface of the plastic disc; a semiconductor laser beam in the player reads these through reflection. Most CDs cannot be written with a laser, but CD-R discs have colored dyes that can be "burned" (written to) once, and CD-RW (rewritable) discs contain phase-change material that can be written and overwritten several times. Most CD-ROM drives can read CD-R discs; modern drives carrying the MultiRead mark can read CD-RW discs.

Manufacture

CD-ROMs are always pressed (mass-produced), whereas CD-Rs are recorded one at a time. The contents of a CD-R may be in logical CD-ROM format (Yellow Book) but the disc itself is physically a CD-R (Orange Book).

Source: Dana J. Parker, author of The CD-Recordable Handbook. [1] (http://www.amazon.com/exec/obidos/tg/detail/-/0910965188/qid=1111091690/sr=1-2/ref=sr_1_2/103-7169860-

7230214?v=glance&s=books)

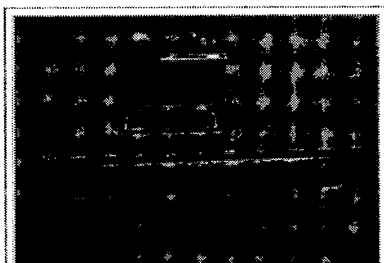
Capacity

The standard CD-ROM can hold 650-700 megabytes of data. The CD-ROM is popular for distribution of software, especially multimedia applications, and large databases. A CD weighs under an ounce. To put the CD-ROM's storage capacity into context, the average novel contains 60,000 words. Assume that average word length is 10 letters - in fact it is less than 10 - and that each letter occupies one byte. A novel therefore might occupy 600,000 bytes. One CD can therefore contain over 1,000 novels. If each novel occupies half an inch of bookshelf space, then one CD can contain the equivalent of about 15 yards (~16.5 metre) of bookshelf. However textual data can be compressed by more than a factor of ten, using computer compression algorithms (often known as 'zipping'), so a CD-ROM can accommodate at least 100 yards of bookshelf space. In comparison a DVD typically contains 4.7 GB of data or more, depending upon its type. Dual layer DVD+R discs, for example, contain 8.5GB of data for a normal sized (12 cm) disc.

Type	Time	Sectors	CD-DA max size, bytes	CD-DA max size, MiB	Data max size, bytes	Data max size, MiB
	21 minutes	94 500	222 264 000	212.0 MiB	193 536 000	184.6 MiB
	63 minutes	283 500	666 792 000	635.9 MiB	580 608 000	553.7 MiB
"650MB"	74 minutes	333 000	783 216 000	746.9 MiB	681 984 000	650.3 MiB
"700MB"	80 minutes	360 000	846 720 000	807.4 MiB	737 280 000	703.1 MiB
	90 minutes	405 000	952 560 000	908.4 MiB	829 440 000	791.0 MiB
	99 minutes	445 500	1 047 816 000	999.3 MiB	912 384 000	870.1 MiB

CD-ROM drives

CD-ROMs are read using CD-ROM drives and written with CD recorders (often referred to as "burners"). CD-ROM drives—now almost-universal on personal computers—may be connected to the computer via an IDE (ATA) interface, a SCSI interface or a proprietary interface, such as the Panasonic CD interface. Most CD-ROM drives can also play audio CDs and Video CDs with the right software.



CD-ROM drive

CD-ROM drives are rated with a speed factor relative to music CDs: 1x or 1-speed which gives a data transfer rate of 150 kilobytes per second in the most common data format. For example, an 8x CD-ROM data transfer rate would be 1.2 megabytes per second. Above 12x speed, there are problems with vibration and heat. Constant angular velocity (CAV) drives give speeds up to 20x but due to the nature of CAV the actual throughput increase over 12x is less than 20/12. 20x was thought to be the maximum speed due to mechanical constraints until February 1998, when Samsung Electronics introduced the SCR-3230, a 32x CD-ROM drive which uses a ball bearing system to balance the spinning disc in the drive to reduce vibration and

noise. As of 2004, the fastest transfer rate commonly available is about 52x or 7.62 megabytes per second, though this is only when reading information from the outer parts of a disc. Future speed increases based simply upon spinning the disc faster are particularly limited by the strength of polycarbonate plastic used in CD manufacturing. Speed improvements can however still be obtained by the use of multiple laser pickups as demonstrated by the Kenwood TrueX 72x which uses seven laser beams and a rotation speed of approximately 10x.

CD-Recordable drives are often sold with three different speed ratings, one speed for write-once operations, one for re-write operations, and one for read-only operations. The speeds are typically listed in that order; ie a 12x/10x/32x CD drive can, CPU and media-permitting, write to CD-R disks at 12x speed (1.76 megabytes/s), write to CD-RW discs at 10x speed (1.46 megabytes/s), and read from CD discs at 32x speed (4.69 megabytes/s).

The 1x speed rating for CDs (150 kilobytes/s) is not to be confused with the 1x speed rating for DVDs (1.32 megabytes/s).

Some of the initial versions of CD Drives had a mechanism different from the tray or slot loaders of modern day drives. They could read CDs only when they were inserted in special cartridges. The "CD Caddy" resembled the floppy disk because of its protective casing. It, however, never caught on.

Copyright Issues

There has been a move by the recording industry to make audio CDs (CDDAs, Red Book CDs) unplayable on computer CD-ROM drives, to prevent copying of the music. This is done by intentionally introducing errors onto the disc that audio players can automatically compensate for, but confuse CD-ROM drives. Consumer rights advocates are as of October 2001 pushing to require warning labels on compact discs that do not conform to the official Compact Disc Digital Audio standard (often called the Red Book) to inform consumers of which discs do not permit full fair use of their content.

Manufacturers of CD writers (CD-R or CD-RW) are encouraged by the music industry to ensure that every drive they produce has a unique identifier, which will be encoded by the drive on every disc that it records: the RID or Recorder Identification Code. This is a counterpart to the SID - the Source Identification Code, an eight character code beginning with "IFPI" that is usually stamped on discs produced by CD recording plants.

Data Formats

There are several formats used for CD-ROM data: the Rainbow Books, which include the Green Book, White Book and Yellow Book CD-ROM. ISO 9660 defines the standard file system of a CD-ROM, although it is due to be replaced by ISO 13490. UDF format is used on user-writable CD-R and CD-RW discs that are intended to be extended or overwritten. The bootable CD specification, to make a CD emulate a hard disk or floppy, is called El Torito (apparently named after the restaurant chain).

Informative CD-ROMs may contain links to webpages with additional information. To keep them up to date these are sometimes indirect: they link to webpages maintained by the producer of the CD-ROM which contain the links to external webpages.

See also

- Computer hardware
- MultiLevel Recording
- Phase-change Dual

References

This article was originally based on material from the Free On-line Dictionary of Computing, which is licensed under the GFDL.

External links

- *How CDs Work* from HowStuffWorks.com (http://computer.howstuffworks.com/cd.htm)
- Andy McFadden's CD-Recordable FAQ (http://www.cdrfaq.org/)
- Understanding CD-R & CD-RW (http://www.osta.org/technology/cdqa.htm) by Hugh Bennett

Retrieved from "http://en.wikipedia.org/wiki/CD-ROM"

Categories: FOLDOC sourced articles | 120 mm discs | Computer storage media | Audio storage

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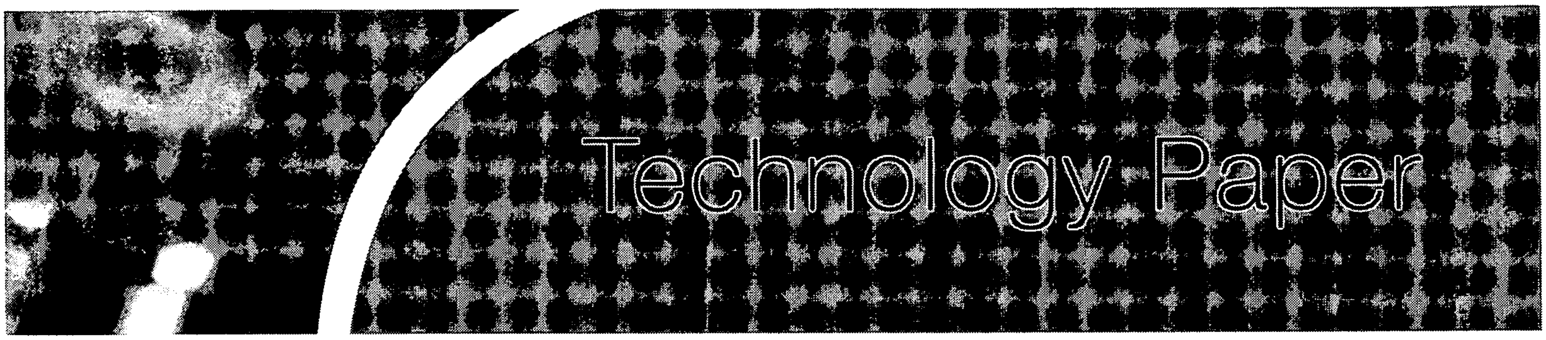
TP-535 • From: Seagate Global Product Marketing • March 2005



Finding the Ideal Disc Drive for 2.5-Inch External USB Applications

Driven heavily by new multimedia applications, today's PC users are becoming increasingly hungry for more storage. Devices like digital cameras, MP3 players and PDAs all have one thing in common: They generate large files but have a limited amount of storage capacity. In addition, digital cameras and camcorders don't have the processing power to edit the images they create. And once manipulated, the new files are stored so they can be easily accessed in the future.

This trend among consumers—along with the peace of mind from backing up files—has taken storage consumption rates off the charts. A common solution is an external USB device powered by a disc drive. External disc drives are available in a variety of form factors, capacities and interfaces; however, the lightweight and portable benefits of 2.5-inch external USB devices are becoming increasingly popular. In fact, many users have found that they can buy an external USB case and drive separately, then easily integrate it themselves. Nonetheless, users are finding that not all disc drives are created equal.

The most ideal solution for 2.5-inch external USB applications is a disc drive with strength in three important areas: 1) ruggedness, 2) reliability and 3) ease of use.

Ruggedness and Reliability

Given the portable nature of 2.5-inch external USB drives, the ruggedness and reliability of the disc drive is extremely important. The disc drive stores data that is critical to the user—data that often cannot be replaced if it is lost. Portability requires ruggedness and reliability.

Drives that utilize ramp load park the heads off to the side of the disc. Ramp load contributes significantly to the increased ruggedness that enables 2.5-inch external USB drives to be portable. Because the heads are unloaded onto the ramp and parked off the disc, the nonoperating shock of the drive is able to reach a higher level of shock tolerance. This also reduces the possibility of head slap, which could potentially damage the disc and any stored data.

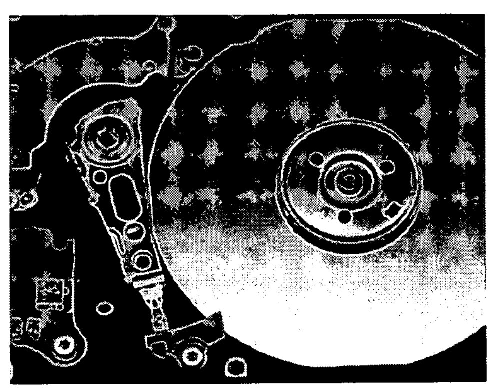


Figure 1. To enable portability, most 2.5-inch drives employ a ramp load mechanism.

Drives for use in external USB applications should be able to withstand a minimum of 800 Gs of nonoperating shock, though 900 Gs is more favorable.

A lot can be said about the reliability of a drive by the warranty offered by the drive manufacturer. Warranties range from one to five years, depending on the brand of disc drive.

Ease of Use

Aside from being lightweight and compact, whether or not the drive provides ease of use relies heavily on the power requirements. A common problem with 2.5-inch drives in an external USB application is the drive's ability to spin up from the current coming off of a single USB cable. Some drives require the use of a second USB cable or even a separate power supply, while others are more power efficient and able to operate from a single USB cable. However, the USB port can also play a role in the drive's ability to spin up off a single cable.

The USB 1.1 and 2.0 specification requires that each USB port delivers at least 500 mA of steady-state current; however the majority of systems provide 700 mA of steady-state current. Most 2.5-inch disc drives meet this requirement only after they are already spinning and usually require a higher current during the initial spin-up profile. The majority of USB ports also allows for a higher current draw of 1000 to 1100 mA for a limited duration (instantaneous current) that allows the disc drive to spin up adequately. This capability varies from PC to PC and depends on a variety of factors such as the type of USB port, the USB controller used, the type of regulator and the type of capacitors at the host.

On most disc drives, the maximum power draw is during the initial few seconds, during which the internal disc pack within the drive is being spun up to the full operational speed. In the design of disc drives, there is a temptation to minimize spin-up time at the expense of the maximum current draw during this time period. For external USB drives, however, maximum current consumed is a much more important parameter than spin-up time.

To ensure that external devices can be powered by USB, many external-case manufacturers include a "Y" cable so a minimum supply of 1000 mA is available to the disc drive; however, this is not always required.

Since it is not possible to validate that any particular disc drive works in all USB boxes, it is important to know which disc drive is best optimized for startup current.

The chart in *Figure 2* shows the peak 5V current draw by several drives during the spin-up process. Among the drives tested, the maximum current draw ranges from 818 mA to 1147 mA instantaneous current. Drives with peak current below 1000 mA is most ideal for external USB applications.

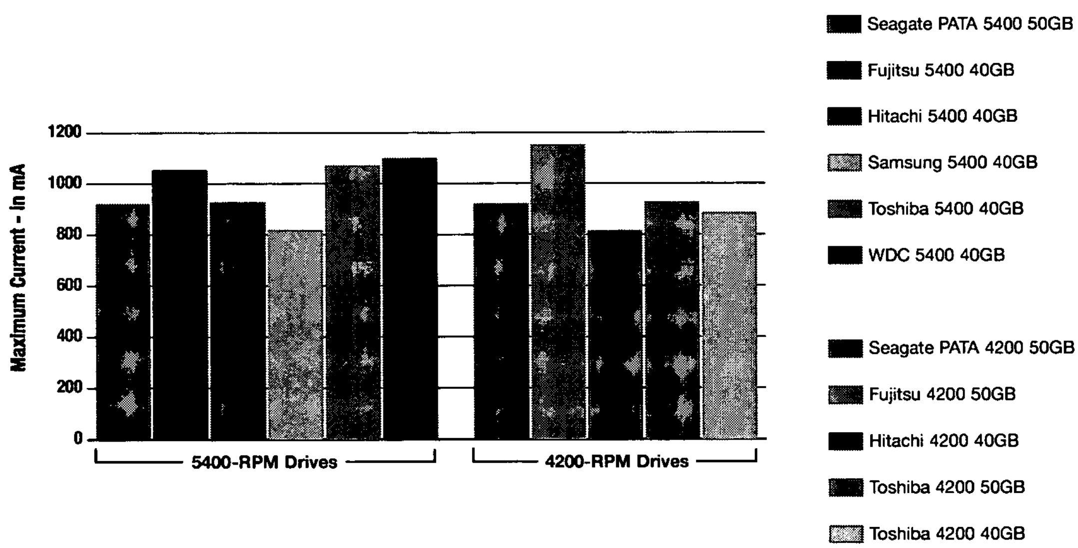


Figure 2. Peak 5v Start Current

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Aside from peak current during startup, the mean current from power-up until the drive comes ready is also important. *Figure 3* shows the measurements of mean current for the same drives as in *Figure 2.* Of the drives tested, the mean current draw ranges from 472 mA to 620 mA. Any drive with mean current below 700 mA is suitable for external USB applications.

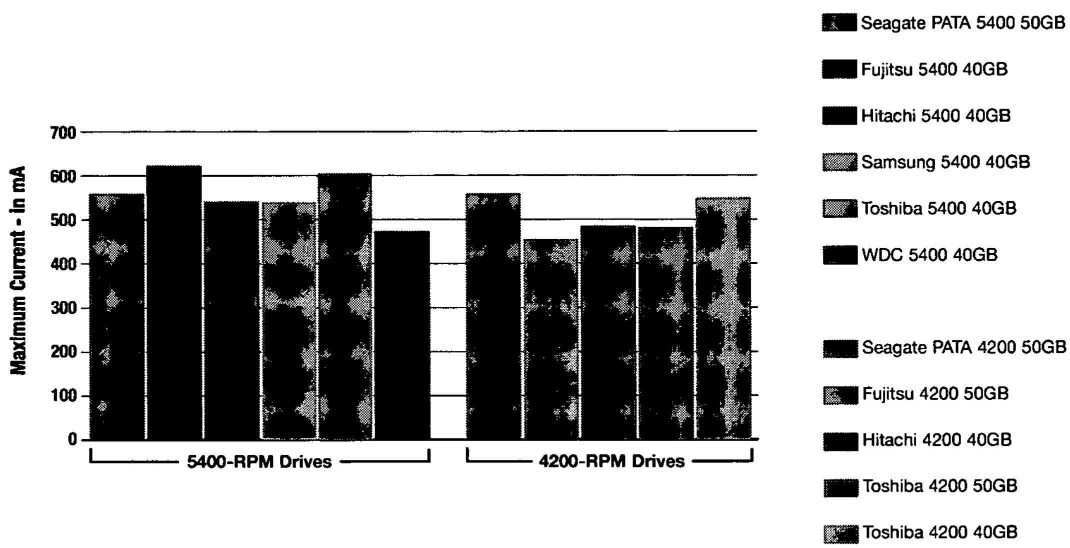

Figure 3. Power Up to Ready Current (mean mA)

All of the drives tested have a mean current below 700 mA; however, only about six of the drives tested have peak startup currents below 1000 mA. Not all drives have the ideal power profile for external USB applications and may require the use of external power supplies or "Y" cables to achieve optimal operation-thus not providing ease of use.

Bottom Line

The ideal disc drive for 2.5-inch external USB applications will deliver strength in ruggedness, reliability and ease of use. It is through the best combination of these three requirements that users will get the most out of their external USB storage device.

Seagate® Momentus™ 4200.2 is optimized for external USB applications. It delivers 900 Gs of nonoperating shock, the unprecedented 5-year warranty and a power profile that allows the USB device to spin up off a single USB cable in the majority of systems.

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ASIA/PACIFIC Seagate Technology International Ltd. 7000 Ang Mo Kio Avenue 5, Singapore 569877, 65-6485-3888
EUROPE, MIDDLE EAST AND AFRICA Seagate Technology SAS 130-136, rue de Silly, 92773 Boulogne-Billancourt Cedex, France, 33 1-41 86 10 00

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